1,037,799

PATENT SPECIFICATION

DRAWINGS ATTACHED

1,037,799

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Int. Cl.:—A 23 c 19/10

COMPLETE SPECIFICATION

Improvements in or relating to Cheese Treating methods and apparatus

We, ARMOUR AND COMPANY, a corporation organized and existing under the laws of the State of Delaware, United States of America of 401 North Wabash Avenue, Chicago 11, State of Illinois, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to cheese treating methods and apparatus, and more particularly to methods and means for treating cheese with sorbic acid in dry form. The invention is applicable also to the treatment of other like plastic bodies.

Present-day centralized cutting and wrapping operations and merchandising methods as practiced in the cheese industry result in a lengthening of the period of time that wrapped consumer-size pieces of cheese remain in trade channels. This situation permits the development of undesirable molds upon the packaged product despite improved sanitation practices in cheese production and wrapping. It is, therefore, necessary to treat the cheese product with harmless food-grade spoilage inhibitors, such as, sorbic acid. Utilization of sorbic acid for the treatment of process cheese has presented no particular problem because the chemical may be simply added to the blend of cheese going into the processing kettle and thus distributed throughout the cheese mass. This procedure, however, is not suitable for natural Cheddar, Swiss, and other cheese in consumer-size pieces, and a problem has long existed with respect to the treatment of such products. Dipping or spraying with solutions is not desirable because the added moisture interferes with wrapping and package sealing. Also, in view of the nature of the fissured surfaces of Cheddar and the eyes in Swiss cheese, there is the possibility of excess liquid antimycotic material collecting in the fissures and eyes of these products.

Treatment with sorbic acid in the form of a dry powder further presents a problem because of the difficulty of uniform application and because loosely-applied powder tends to shake off in the conveying system and to be removed in areas during the wrapping and sealing processes. Excessive amounts of the powder on the cheese blocks are not permitted by legal standards, result in a disagreeable taste, and the presence of the dust in the atmosphere is highly irritating to the processing personnel. Further, substantial losses of the powder acid product are experienced in dusting operations. For effective mold-inhibiting action, it is important to apply to the surfaces of the cheese pieces the permissible legal maximum of 0.1 per cent of sorbic acid, based on the weight of the cheese. If a dry powder is employed in the treating operation, it is extremely difficult to apply to the cheese surface and to retain thereon a coating which is relatively uniform and which lies within this narrow range, and should areas of the cheese have less than 0.05 percent, effective resistance to mold is not provided.

According to the invention there is provided a process for treating a cheese body to inhibit spoilage, comprising the step of impinging on all sides of said body, air streams carrying sorbic acid powder under pressure to embed particles of the powder in the cheese.

The invention is shown, in illustrative embodiments, by the accompanying drawings, in which:

Figure 1 is a perspective view of apparatus embodying the invention and which may be employed in the practice of methods embodying the invention; and

Figure 2, a schematic view illustrating important elements of apparatus which may be employed in the practice of the invention.

[*Price 4s. 6d.*]

In the illustration given in Figure 1, we provide a framework 10 on which is supported a conveyor housing 11. The housing 11 provides a chamber having at its bottom a receptacle 12 in which is mounted a slide drawer 13, the drawer 13 being provided for receiving excess powder. In the upper portion of the closed housing 11 is mounted an open mesh conveyor 14 adapted to carry the cheese body to be treated, and the housing 11 provides entrance and discharge ports for receiving the cheese bodies. Communicating with the housing 11 are suction ducts 15 and 16 which lead to a fan and to filter bags (not shown). A powder receptacle 17 contains a supply of sorbic acid, in powder form, and the air-powder mixture is delivered to a manifold 18 as compressed air is passed through the powder pump assembly. From the manifold, a series of small tubes 19 lead to various positions about the conveyor 14 so as to discharge the compressed air carrying the powder upon all surfaces of the cheese.

Since the operating parts are shown more clearly and in greater detail in the schematic view of Figure 2, reference is now made to Figure 2. Compressed air from a source of supply passes through conduit or manifold 18 which is controlled by the solenoid-operated valve 20. Communicating with the conduit 18 is a powder pump 21 with an air ejector tube extending downwardly into the bottom portion of the powder reservoir of receptacle 17. The discharge ducts 19 communicate with the manifold conduit 18 through a fitting member 22. The ducts or tubes 19 preferably terminate in flared discharge nozzles 23 which are designed to apply the powder to the various surfaces of the cheese piece or block 24. The cheese piece 24 has six sides, and the nozzles 23 are so distributed as to apply the powder evenly with respect to each side, each nozzle being so flared or designed and being so positioned with respect to the cheese block as to cover the area of the face of the cheese toward which the nozzle is directed. Since the conveyor is an open mesh conveyor, the nozzle below the belt is effective in covering the bottom side of the cheese piece simultaneously with the application of the powder to the top and other sides of the cheese piece.

Supported above the conveyor 14 is a microswitch 25 which controls through a relay solenoid 20a governing valve 20. An actuating arm 26 from the micro-switch 25 is engaged by the cheese block 24 as it moves forwardly, thus actuating the microswitch 25 for the opening of valve 20. As the cheese block moves forward during treatment past the arm 26, the arm swings back to its initial position to bring about the closing of valve 20.

In the schematic view shown in Figure 2, the housing 11 is shown in a fragmentary way, but it will be understood that the housing encloses the conveyor and a portion of the tubes 19, as shown more clearly in the structure of Figure 1. Communicating with the housing 11 and in order to maintain it under negative pressure are duct means 15 leading to a suction blower 27. The withdrawn powder is discharged into the chamber 28 and the air is forced through the filter bag 29 thereabove. Settled powder may be collected from the lower receptacle 30.

In practice, it is found that the majority of the excess powder is collected in the drawer 13 illustrated in Figure 1, and instead of employing a drawer, it will be understood that connections may be provided for the automatic return of the powder through sieving apparatus to the supply chamber 17 for reuse. Withdrawn air through the ducts 15 and recovered powder from the filter receptacle 29 may also be returned to the supply chamber 17 for reuse.

In the foregoing operation and apparatus, it is found that an accurate application of the treating powder to all sides of the cheese or plastic body is accomplished so that the body is coated with a uniform coating of sorbic acid dust at a given chosen level between 0.05 and 0.1 percent of the weight of the cheese. This is accomplished by impinging the compressed air carrying the powder with force upon the cheese body. The powder particles under the force of the impinging streams stick to the cheese body because a substantial number of particles become embedded in the cheese and serve as lodging means or retainers for the applied powder. Further, the particles thus effectively applied to the cheese body remain thereon during travel on the conveyor and during subsequent wrapping and packaging procedure.

While the pressure employed may be varied depending upon the treating powder employed, we prefer to use pressures in the range of 10 to 5 pounds per square inch. Excellent results have been obtained by using about 15 pounds per square inch at the powder pump. With these pressures, sorbic acid particles are retained upon the cheese body in coatings of little less than 0.1 percent based on weight of the cheese.

The open mesh conveyor 14 may be supported by any suitable number of rollers, and one or more of the rollers may be driven. In the specific illustration given in Figures 1 and 2, the roller 30 is driven by a motor (not shown). The conveyor speed of the specific apparatus illustrated in Figure 1 is about 42 feet per minute in order to synchronize with the speed of the wrapping line conveyor, but it will be understood that the speed may be varied greatly, and the powder-applying mechanism can be adjusted to the changed speed of the conveyor. The amount of powder applied can be controlled through adjustment of the powder pump 21 and through the pressure of the air fed through conduit 18.

By providing suction ducts 15 communicating with the housing, excess floating particles of the powdered chemical are removed, and an accurate control of the application of powder to the cheese is maintained by the use of compressed air carrying powder through the ducts 19. If desired, the housing may be maintained under negative pressure so that the air flow is from the outside into the housing and the treating powder does not escape into the operating room.

The anti-microbial food spoilage powder or dust may comprise crystalline sorbic acid, salts of sorbic acid, metal salts of propionic acid, such as sodium and potassium propionates, hydroxyl esters of benzoic acid, and other known food spoilage inhibitors. Since such anti-microbial food spoilage agents are well known, a further detailed description is believed unnecessary.

Specific examples illustrative of the process may be set out as follows:

EXAMPLE I

Cheese pieces at room temperature were passed through the housing 11 on conveyor 14, as illustrated in Figures 1 and 2, the air pressure being maintained at about 15 psi. Cheese pieces weighing in the aggregate 5,560 pounds were treated, using 5.75 pounds of sorbic acid. The percent of sorbic acid on each block of cheese was found to be 0.103 percent based on the cheese weight. The conveyor belt was 10½ feet long and was operated at 42 feet per minute. Good coverage was obtained on all six surfaces of each block of cheese. It was found that about one-third of the sorbic acid particles stuck to the cheese; the remaining two-thirds were recovered from the drawer 13 in the bottom of housing 11. The recovered powder was sieved in a 25 mesh screen to remove particles of cheese, and the recovered powder was reused in the operation.

EXAMPLE II

The process was carried out as described in Example I except that the cheese blocks aggregated 3,060 pounds and the amount of sorbic acid used was 4.25 pounds. The percent of sorbic acid retained on each cheese block was 0.139 percent.

EXAMPLE III

The process was carried out as described in Example I except that cheese pieces aggregated 1,978 pounds and the amount of sorbic acid used was 2.50 pounds. The percent of the coating of sorbic acid on the cheese by weight was 0.129 per cent.

Tests showed that the application of 0.1 percent or slightly less of sorbic acid to the cuts of natural cheese as treated in the above examples was effective in inhibiting mold for long shelf life, while also resulting in no off-flavour with respect to the cheese product. The coatings were substantially uniform on all six sides of each cheese piece or block, the coatings being retained effectively thereon during conveying and wrapping, etc.

We are aware of the Preservatives in Food Regulations, 1962, and insofar as our invention relates to the manufacture for sale in the United Kingdom and/or sale in the United Kingdom of foodstuffs preserved by the process herein described, we make no claim to use the invention in contravention of the law.

Subject to the foregoing disclaimers,

WHAT WE CLAIM IS:—

1. A process for treating a cheese body to inhibit spoilage, comprising the step of impinging on all sides of said body, air streams carrying dry sorbic acid powder under pressure to embed particles of the powder in the cheese.

2. A process claimed in claim 1 wherein said powder is passed from a source of supply into said air streams.

3. A process as claimed in claim 1 or claim 2 in which the air pressure is between 10 and 20 pounds per square inch.

4. A process as claimed in claim 1 or claim 2 in which the air pressure is about 15 pounds per square inch.

5. A process as claimed in any preceding claim in which excess powder not embedded in the cheese is sieved to remove cheese particles and reused in the treatment of cheese pieces.

6. A process as claimed in any preceding claim wherein said treatment is carried out in a treating zone under negative pressure.

7. Apparatus for treating cheese with dry powder according to the process of claim 1, comprising an open mesh conveyor for supporting a piece of cheese, ducts provided with nozzles spaced from said cheese for discharging powder upon the sides of said cheese, and means for supplying compressed air and powder to said ducts.

8. Apparatus for directing dry powder upon a cheese body, comprising means including an open mesh conveyor for advancing said body, conduits supported about said body for delivering an air stream against all sides of said body, means for supplying powder to said air stream, and control means actuated by contact with the plastic body for applying said air and powder to said body while in contact with said body.

9. Apparatus as claimed in claim 8, wherein said conduit is a manifold conduit, wherein conduits lead from said manifold to points about said body.

10. Apparatus as claimed in claim 8 or claim 9, wherein said conduit is controlled by a valve and wherein said control means open said valve when said body reaches a predetermined point and close said valve when said body passes beyond said point.

11. Apparatus as claimed in claim 8, claim 9 or claim 10, further comprising a reservoir

for said powder and a supply duct between said conduit and said reservoir.

12. Apparatus as claimed in any of claims 8 to 11 in which a housing is provided about said conveyor and in which suction means communicates with said housing for removing floating powder therein.

13. Apparatus as claimed in claim 12 comprising suction means communicating with the interior of said housing for maintaining a negative pressure therein.

14. A process for treating a cheese body, substantially as described herein, with reference to any one of the foregoing Examples.

15. Apparatus for directing dry powder upon a cheese body, substantially as described herein, with reference to and as illustrated by the accompanying drawings.

16. Cheese when treated by the process of any of claims 1 to 6 or 14.

17. Cheese when treated using the apparatus claimed in any of claims 7 to 13 or 15.

ARMOUR AND COMPANY,
Per: Boult, Wade & Tennant,
112, Hatton Garden, London, E.C.1.
Chartered Patent Agents.

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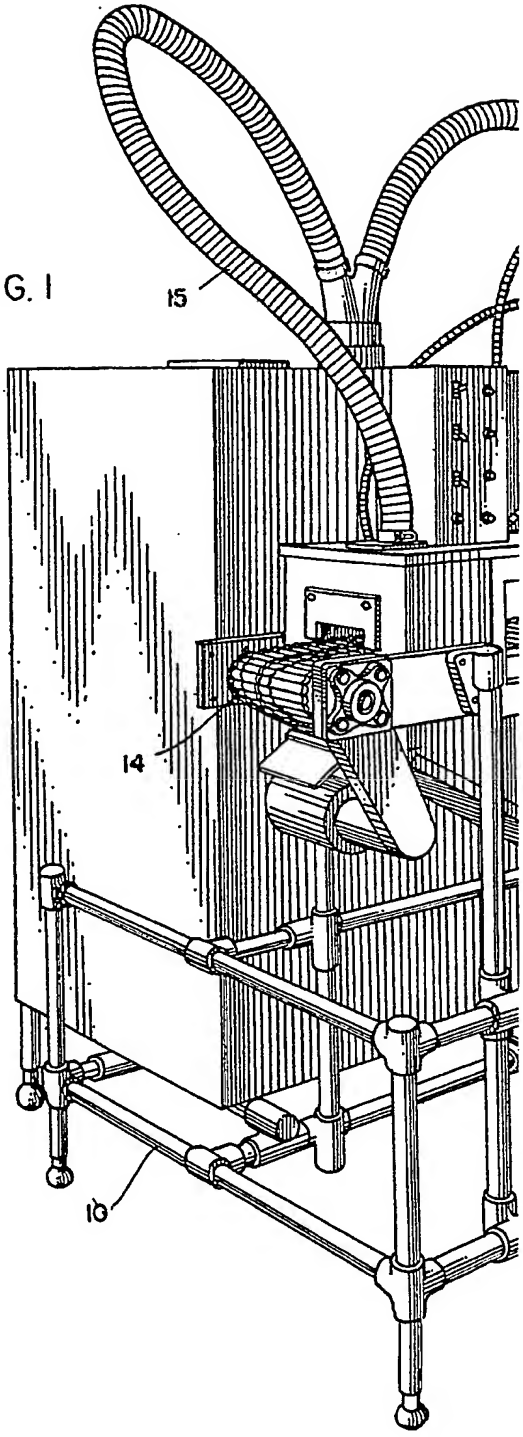
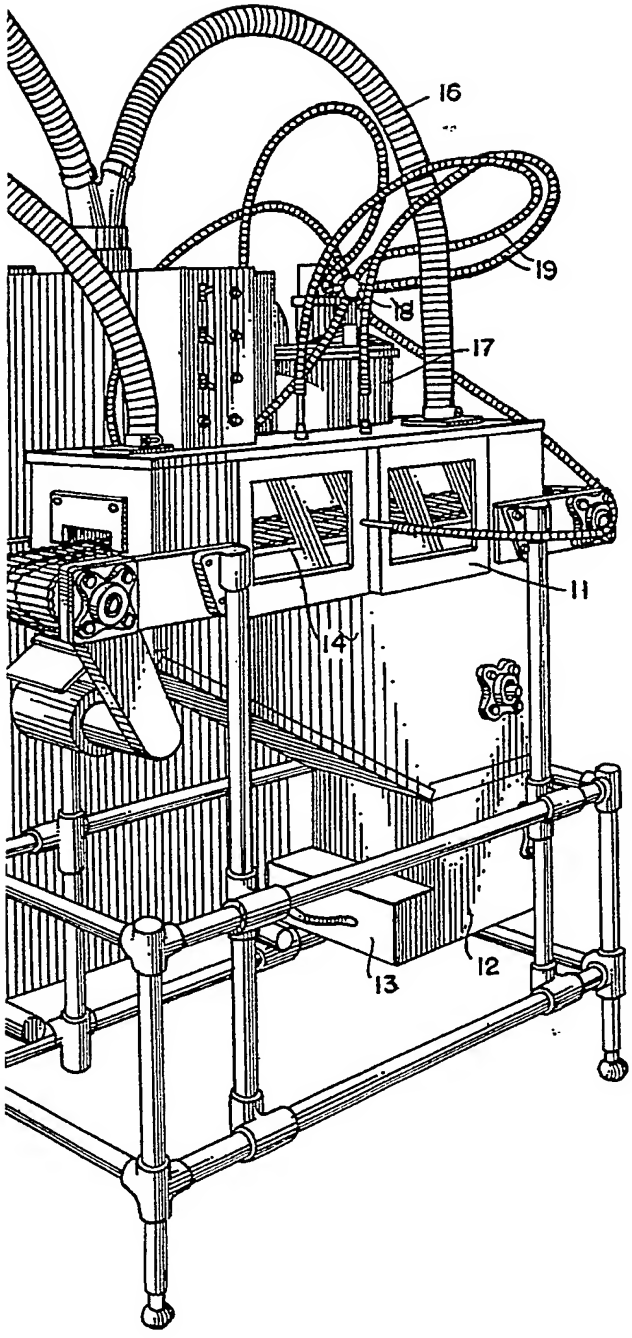
FIG. 1



1,037,799 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*

SHEET 1



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2 SHEETS

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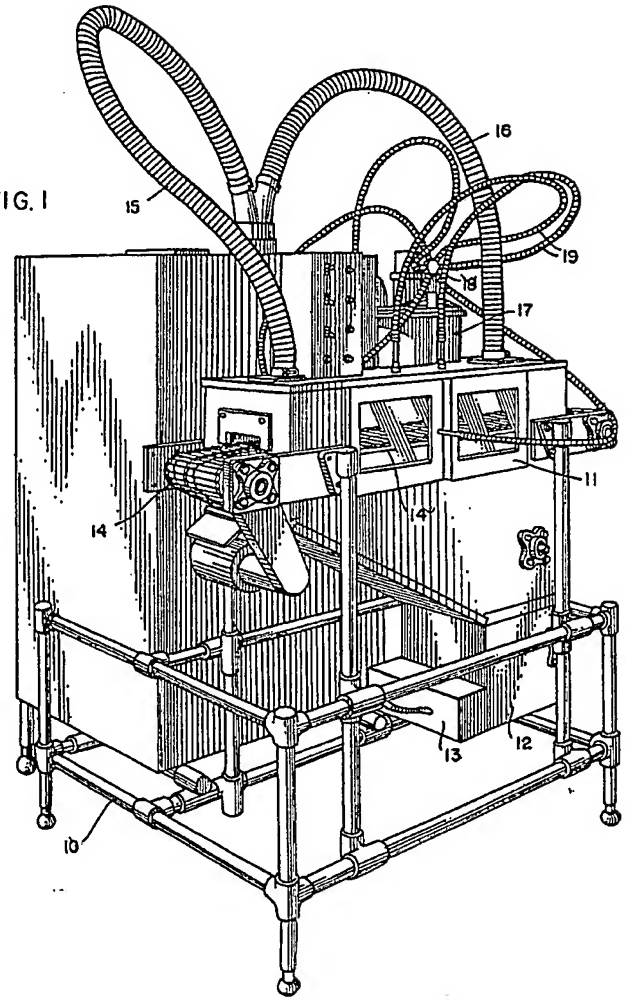
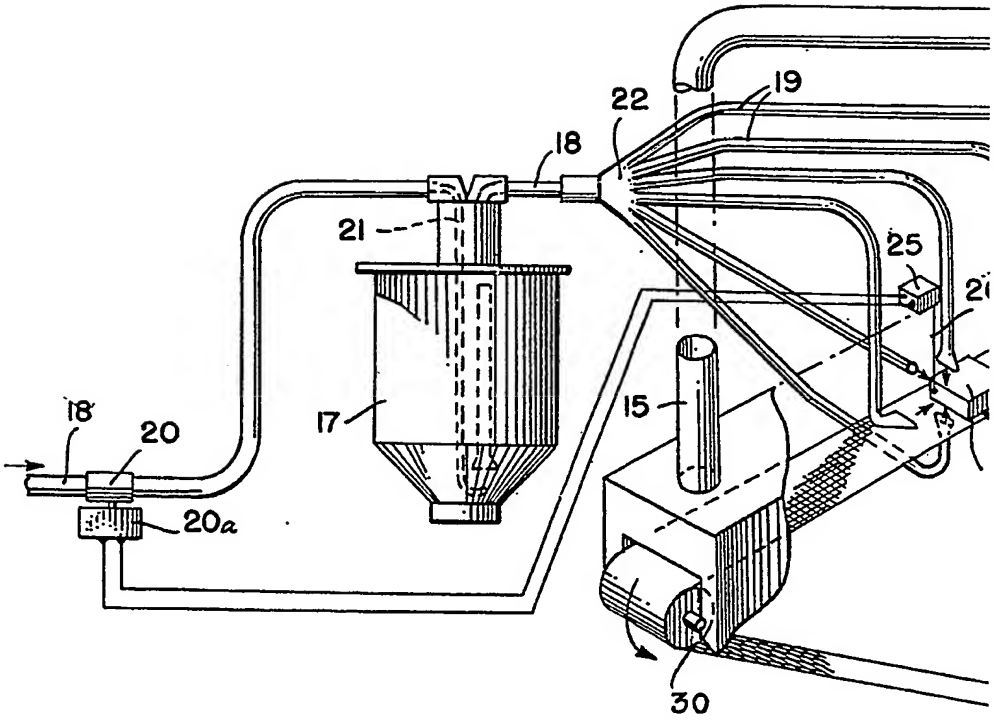
SHEET 1

FIG. 1





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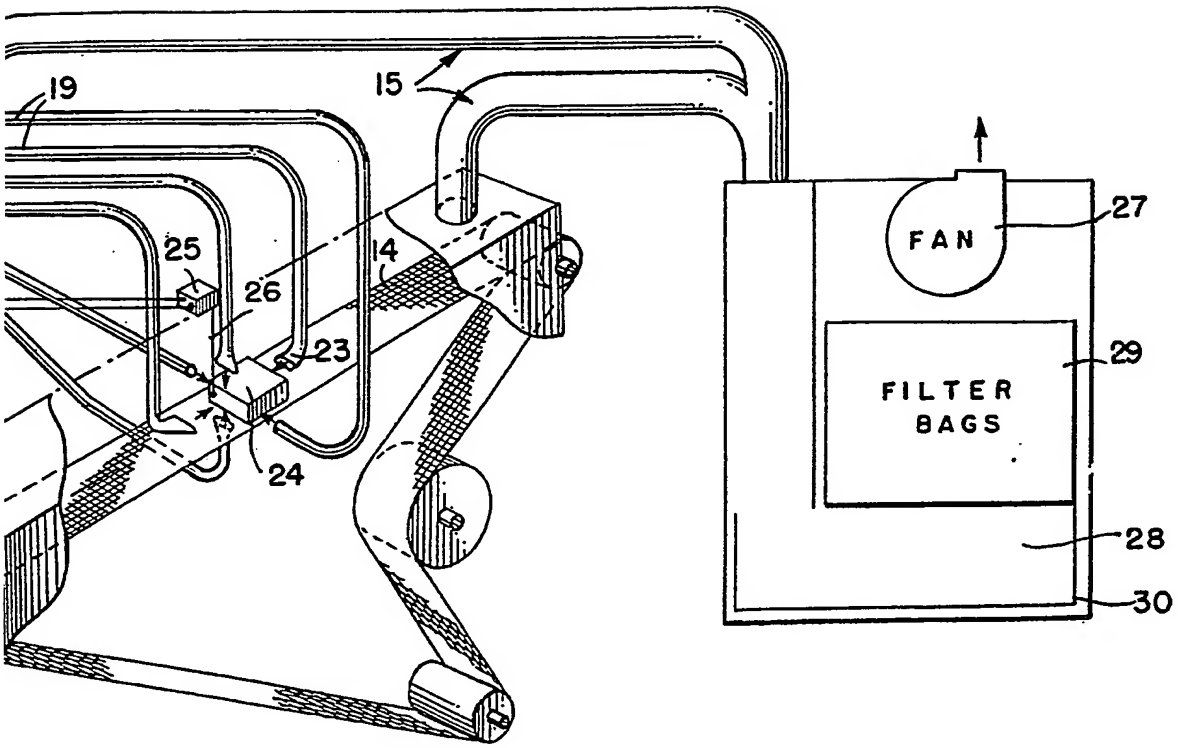

FIG. 2

1,037,799 COMPLETE SPECIFICATION
2 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 2

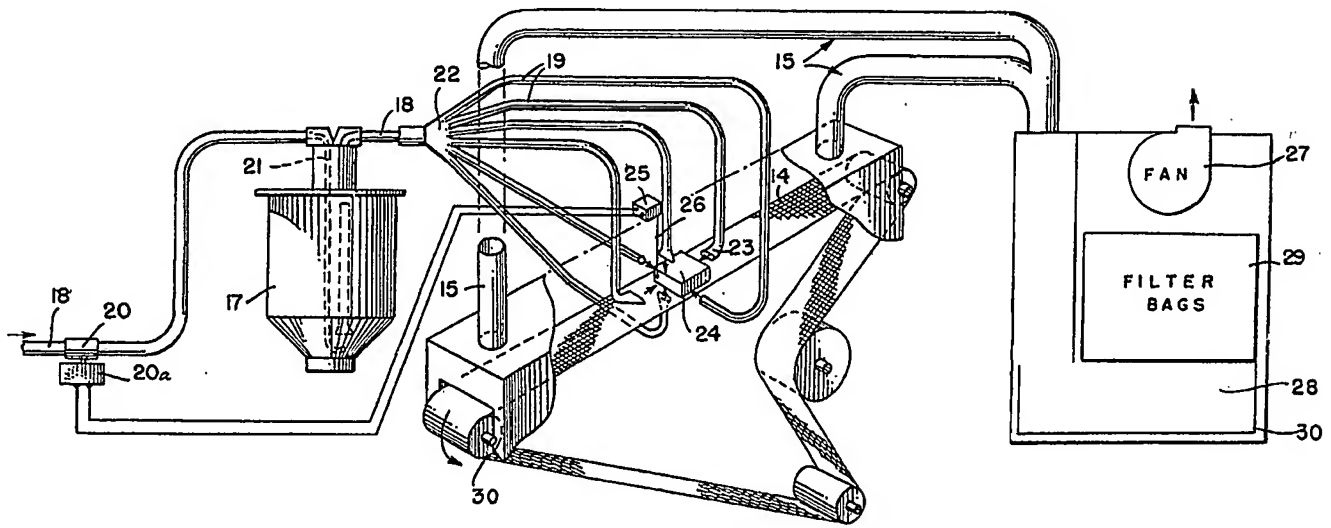

FIG. 2